

WHAT IS CLAIMED IS:

1. A data processing method comprising the steps of:

5 arranging data in bytes in a matrix direction to form information data block;

15 constituting an outer parity with respect to 32k bytes unit of the information data block as an error correction code; and

20 further adding an overall error correcting code including the outer parity in the ^{the} 62k byte unit of the information data block.

2. A data processing method, ^{comprising the steps of:} ~~wherein:~~

15 digital data is processed in bytes to configure one information data block in $(M \times N)$ bytes of M rows \times N columns;

20 data is arranged in bytes in the information data block, so that data is arranged in the data transmission order from the 0th column to the $(N-1)$ -th column for each row while data is arranged in the data transmission order from the 0-th row to the $(M-1)$ -th row;

25 $(K \times M)$ rows \times N columns matrix block is further constructed which is a set of the information data block, and which is constituted of K information data blocks composed of information data blocks from the 0-th information data block to the $(K-1)$ -th information data block which continue in the data transmission

order;

on each column of $(K \times N)$ bytes of the matrix block, an error-correcting word $PO-b\{(K/2) \times Q$ bytes} is created with respect to the $(K/2) \times (mi + mj)$ bytes which is constituted by aggregating the even-number rows and the odd-number rows specified in the K information data block order, and an error-correcting word $PO-b\{(K/2) \times Q\}$ bytes is created with respect to the $(K/2) \times (mj + mi)$ bytes which is constituted by aggregating the remaining even-number rows and the odd-number rows specified in the K information data blocks;

$PO-a$ and $PO-b$ are scattered and arranged into K information data blocks constituted of $(M \times N)$ bytes of N rows and N columns so that

each column of N columns is formed as two sets of Reed-Solomon code PO of $(K/2) \times (mi + mj) + Q$ bytes and $(K/2) \times (mj + mi) + Q$ bytes (however, $M = mi$ (the number of even-number rows) + mj (the number of odd-number rows) and $(Q$ is an integer of 1 or more)); and

the error-correcting word of P bytes is further added for each row of N bytes;

whereby as an overall block an error-correcting product code block is realized which constitutes $(K \times (M + Q)) \times (N + F)$ or $(K \times (M + 2Q)) \times (N + P)$ bytes Reed-Solomon error-correcting word having K information data block of $(K \times M \times N)$ bytes as information portion.

3. The processing method according to claim 2,
wherein when M is an even number, and Q is 1,

5 the even number rows of the even-number-th
information data block and the odd-number rows of the
odd-number-th information data block are aggregated to
create the PO-a while

10 the odd number rows of the even-number-th
information data block and the even number rows of the
odd-number-th information data block are aggregated to
25 create PO-b.

15 4. The data processing method according to
claim 2, wherein when Q is 2 or more, and the M is an
even number, the even number rows of the even-number-th
information data blocks and the odd-number rows of the
odd-number-th information data blocks are aggregated to
create the PO-a while

20 the odd number rows of the even-number-th
information data blocks and the even number rows of the
odd-number-th information data blocks are aggregated to
create PO-b.

25 5. The data processing method according to
claim 2, wherein when Q is 2 or more and M is an even
number, the even-number rows of all the information
data blocks are aggregated to create the PO-a while the
odd-number rows of all the information data blocks are
aggregated to create the PO-b.

6. A data processing apparatus, wherein:

digital data is processed in bytes to configure one information data block in $(M \times N)$ bytes of M rows and N columns;

data is arranged in bytes in the information
5 data block, so that data is arranged in the data transmission order from the 0th column to the $(N-1)$ -th column for each row while data is arranged in the data transmission order from the 0-th row to the $(M-1)$ -th row;

10 $(K \times M)$ rows $\times N$ columns matrix block is further constructed which is a set of the information data block, and which is constituted of K information data blocks composed of information data blocks from the 0th information data block to the $(K-1)$ -th information data
15 block which continue in the data transmission order;

on each column of $(K \times N)$ bytes of the matrix block, an error-correcting word $PO-a\{(K/2) \times Q$ bytes} is created with respect to the $(k/2) \times (m_i + m_j)$ bytes which is constituted by aggregating the even-number rows and the odd-number rows specified in the K information data block order, and an error-correcting word $PO-b\{(K/2) \times Q\}$ bytes is created with respect to the $(K/2) \times (m_j + m_i)$ bytes which is constituted by aggregating the remaining even-number rows and the odd-number rows specified in the K information data blocks;
20
25

$PO-a$ and $PO-b$ are scattered and arranged into K information data blocks constituted of $(M \times N)$ bytes of

M rows and N columns so that

each column of N columns is formed as two sets of Reed-Solomon code P0 of $(K/2) \times (m_i + m_j + Q)$ bytes and $(K/2) \times (m_j + m_i + Q)$ bytes (however, M = mi (the number of even-number rows) + mj (the number of odd-number rows) and Q is an integer of 1 or more); and

5 the error-correcting word of P bytes is further added for each row of N bytes;

whereby as an overall block an error-correcting product code block is realized which constitutes $(K \times (M + Q) \times (N + P))$ or $(K \times (M + 2Q) \times (N + P))$ bytes Reed-Solomon error-correcting word having K information data blocks of $(K \times M \times N)$ bytes as information portion.

15 7. A recording medium, wherein an error-correcting product code is recorded with the data processing method according to claim 1 or 2.

8. A data processing apparatus comprising a step of transmitting an error-correcting product code constructed with the data processing method according to claim 1 or 2.

20 9. A data reproducing method comprising the steps of:

receiving an error-correcting constructed with the

25 15 data processing method according to claim 1 or 2;

subjecting the block to rearrangement of rows of the blocks; and

forming the rows to a set of rows in which two sets of Reed-Solomon codes P0 are created to carry out each set of error correcting process.

10. A data reproducing apparatus comprising:

5 error-correcting means for carrying out each set of error correcting process by receiving the error correcting product code which is constructed in the data processing method according to claim 1 or 2; and
 means for reproducing each row that has been
10 processed with the error processing means at the arrangement position at the time of the error-correcting product code block.

TELETYPE